

What claimed is:

1. A filtration device with cross-flow function comprising:
 - a case having an inlet and an outlet, fluid directly flowing into the case through the inlet and the outlet;
 - a filter wrapped in the case and a passage located in between from the inlet to the outlet;
 - a diffuser placed inside the filter and set along a longitudinal direction, the diffuser having at least one support connected around the inlet of the case to cause cross-flow circulating inside the filter for preventing cake formation on a surface of the filter, the diffuser is consisted of a tapered section, a throat section and an flared section.
2. The filtration device with cross-flow function of claim 1, wherein the inlet includes a nozzle for accelerating flow velocity into the diffuser.
3. The filtration device with cross-flow function of claim 1, wherein the diffuser is provided with a spiral diversion device for producing spiral cross-flow and promoting cross-flow efficiency.
4. The filtration device with cross-flow function of claim 3, wherein the spiral diversion device has spiral fins on an outer rim of the diffuser.
5. The filtration device with cross-flow function of claim 1, wherein the case includes a drain outlet for adjusting impurity and particle concentrations of the fluid inside the filter.
6. The filtration device with cross-flow function of claim 5, wherein at least one drain valve is provided at the drain outlet.
7. A filtration method with cross-flow function comprising:
 - (a) providing a filtration device having a case, a filter and a diffuser, the case having an inlet and an outlet, and the diffuser having a tapered section, a throat section and a flared section;
 - (b) flowing fluid into the inlet, and through the tapered section of the diffuser for producing a local low-pressure whereby fluid flowing

outside the diffuser is entrained into the tapered section, and then through the throat section;

5 (c) flowing fluid continuously through the flared section gradually to decrease flow velocity and thus converting kinetic energy into pressure energy to form a local high-pressure region at an exit of the diffuser; and

10 (d) passing the fluid to exit from the diffuser through a passage formed by an outer surface of the diffuser and an inner surface of the filter, whereby the fluid is entrained back into the tapered section, to form the circulating cross-flow.

8. The filtration method with cross-flow function of claim 7, wherein the inlet is a nozzle for accelerating fluid flow velocity.

9. The filtration method with cross-flow function of claim 8, wherein the diffuser is a spiral diversion device for producing spiral cross-flow to increase cross-flow efficiency.

10. The filtration method with cross-flow function of claim 9, wherein the spiral diversion device has spiral fins on an outer rim of the diffuser.

11. The filtration method with cross-flow function of claim 9, wherein the case includes a drain outlet for adjusting the concentration of impurity and particle concentrations of the fluid inside the filter.